SE0301- further Research Requested by State

High - DGW
D.2 2/2/88
11/2/87

SITE DESCRIPTION/EXECUTIVE SUMMARY

State Lead

Site Name and Location

Cooper School
28611 Ann Arbor Trail
Westland, MI 48185

County: Wayne
Michigan Code Number: 82-02S-09E-01CB
DNR District: Detroit
EPA ID Number: MID981189905

SAS Score/Screen No.: 02

The Cooper School site was an active municipal waste landfill from approximately 1925 to 1952. According to the Wayne County Health Department records, the types and amounts of municipal waste deposited in the landfill are unknown as well as its size.

The landfill, located on Cooper Elementary School property, is unfenced, and adjacent to a highly populated residential area and public park. The Rouge River, located approximately 800 feet from the site, flows through the park and lends itself to potential contamination through surface water runoff should the landfill be leaking.

The drinking water for residents within a three mile radius of the site is derived from Detroit's municipal water system, and is not threatened by the presence of the landfill.

No testing of water or soil has been conducted, and it is not known whether or not leachate from the landfill is present. The potential for such leachate is high as the site was active prior to Act 87, requiring the licensing of landfills.

Further research and preliminary water and soil testing is recommended as this landfill has the potential of endangering approximately four hundred children attending the school, as well as nearly 100,000 residents in the surrounding area.

Recommendations for EPA

This site receives a high priority for inspection
Pre-HRS Score: To be determined
Projected HRS Score: ~~To be determined~~
SI Priority: High - State lead
Hours Spent: 10 + 15 + ____ + ____ + ____ = 10.5
Initial & Date: ~~DB 11-17-87~~ SC 11/17/87 ____ ____ ____ ____

Date of Previous Summary:
Previous Author:

Current Date:
Author: Debra Spakoff

#MIN000631 TW

Site Assessment Unit
Environmental Response Division
Michigan Dept. of Natural Resources

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

EPA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
26	MID981189935

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
Cooper School	28611 Ann Arbor Trail

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
Westland	MI	48185	Wayne	163	15

09 COORDINATES LATITUDE	LONGITUDE	
42° 20' 45"	83° 19' 23"	Inkster Quad. Mich-Wayne Co. 7.5 minute Series

10 DIRECTIONS TO SITE (Starting from nearest public road)
From Lansing take I-96 East to Livonia, exit at Middlebelt Rd. Go South on Middlebelt approximately 1½ miles to Ann Arbor Trail. Turn left (east) onto Ann Arbor Tr. The School is ½ mile down Ann Arbor Tr. on the right or South side of the road.

III. RESPONSIBLE PARTIES

01 OWNER (If known)	02 STREET (Business, mailing, residential)		
Wayne County (Livonia School District)			

03 CITY	04 STATE	05 ZIP CODE	06 TELEPHONE NUMBER
Westland	MI		( )

07 OPERATOR (If known and different from owner)	08 STREET (Business, mailing, residential)		
Doreen Reid (Principal)	28611 Ann Arbor Trail		

09 CITY	10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER
Westland (Part of Livonia School Dist.)	MI	48135	(313) 523-9476

13 TYPE OF OWNERSHIP (Check one)
☐ A. PRIVATE ☐ B. FEDERAL: _____ (Agency name) ☐ C. STATE ☐ D. COUNTY ☑ E. MUNICIPAL
☐ F. OTHER: _____ (Specify) ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)
☐ A. RCRA 3001 DATE RECEIVED: ___/___/___ (MONTH DAY YEAR) ☐ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: ___/___/___ (MONTH DAY YEAR) ☑ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION
☐ YES ☒ NO DATE ___/___/___ (MONTH DAY YEAR)

BY (Check all that apply)
☐ A. EPA ☐ B. EPA CONTRACTOR ☑ C. STATE ☐ D. OTHER CONTRACTOR
☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: _____ (Specify)
CONTRACTOR NAME(S): _____

02 SITE STATUS (Check one)
☐ A. ACTIVE ☑ B. INACTIVE ☐ C. UNKNOWN

03 YEARS OF OPERATION
Approx. 1925 (BEGINNING YEAR) | 1952 (ENDING YEAR) ☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED
Municipal waste

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION
Environment: Surface and groundwater contamination. The landfill is located 800'-1000' from the Rouge River Soil Contamination
Population: Direct Contact. The landfill is located on school property

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)
☐ A. HIGH (Inspection required promptly) ☐ B. MEDIUM (Inspection required) ☐ C. LOW (Inspect on time available basis) ☐ D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NUMBER
Bob Ratz	Wayne County Health Dept.	(313) 326-4900

04 PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NUMBER	08 DATE
D. Spakoff / S. Cunningham	MDNR	E.R.D.	(517) 373-4803	11 12 87 (MONTH DAY YEAR)

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
26	MID 981159425

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- ✓ A. SOLID
- B. POWDER, FINES
- C. SLUDGE
- E. SLURRY
- ✓ F. LIQUID
- G. GAS
- D. OTHER (Specify)

02 WASTE QUANTITY AT SITE
(Measures of waste quantities must be independent)

- TONS
- CUBIC YARDS Unknown
- NO. OF DRUMS Unknown

03 WASTE CHARACTERISTICS (Check all that apply)

- ✓ A. TOXIC
- B. CORROSIVE
- C. RADIOACTIVE
- ✓ D. PERSISTENT
- ✓ E. SOLUBLE
- F. INFECTIOUS
- ✓ G. FLAMMABLE
- H. IGNITABLE
- I. HIGHLY VOLATILE
- J. EXPLOSIVE
- ✓ K. REACTIVE
- ✓ L. INCOMPATIBLE
- M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS	Unknown		
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS	Unknown		Most likely Phenol
IOC	INORGANIC CHEMICALS			
ACD	ACIDS	Unknown		
BAS	BASES	Unknown		
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
Sol	Unknown	999		NO LAB REPORT	—
OCC	Unknown	999			—
ACD	Unknown	999			—
BAS	Unknown	999			—

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

MDNR Lansing files E.R.D
Wayne County Health Department

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
26	MED981184400

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☑ A. GROUNDWATER CONTAMINATION — 02 ☐ OBSERVED (DATE: _____) — ☑ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: unknown — 04 NARRATIVE DESCRIPTION

There is high potential for groundwater contamination since the landfill was active prior to Act 87, and because of the irregular, discontinuous nature of soil strata.

01 ☑ B. SURFACE WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: _____) — ☑ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 50,000 — 04 NARRATIVE DESCRIPTION

There is a high potential for surface water contamination since surface water runoff from the landfill site area flows into the Rouge River located 800' - 1000' away

01 ☐ C. CONTAMINATION OF AIR — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

N/A

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

N/A

01 ☑ E. DIRECT CONTACT — 02 ☐ OBSERVED (DATE: _____) — ☑ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 1,500 — 04 NARRATIVE DESCRIPTION

There is potential for direct contact espacially by children since the landfill is on elementary school property and is not fenced.

01 ☑ F. CONTAMINATION OF SOIL — 02 ☐ OBSERVED (DATE: _____) — ☑ POTENTIAL — ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: 5-10 (Acres) — 04 NARRATIVE DESCRIPTION

There is potential for contamination of soil since the site is most likely in permeable strata.

01 ☐ G. DRINKING WATER CONTAMINATION — 02 ☐ OBSERVED (DATE _____) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

N/A

01 ☐ H. WORKER EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

N/A

01 ☑ I. POPULATION EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: _____) — ☑ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 1,500 — 04 NARRATIVE DESCRIPTION

Since the site has high potential for surface water, ground water, and soil contamination, population exposure could be very extensive considering the immediate area is residential.

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
26	MID 981 894 265

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☑ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: _____) ☑ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
Surface water runoff could damage flora located between the Site and the Rouge River.

01 ☑ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) ☑ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)
The Site is located within 600' of the Edward Hines Park boundary in which contamination of flora and water would affect park animals (raccoons, opossum, birds etc.) as well as dogs and cats from the residential area

01 ☑ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: _____) ☑ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
The migration of contamination into the Rouge River could affect the food chain as fish from the river are consumed by humans

01 ☑ M. UNSTABLE CONTAINMENT OF WASTES (Spills/runoff/standing liquids/leaking drums) — 02 ☐ OBSERVED (DATE: _____) ☑ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 101700
04 NARRATIVE DESCRIPTION
The potential for unstable containment of wastes exists as the landfill was active prior to Act 87 when landfills were not licensed.

01 ☑ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) ☑ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
The potential of damage to offsite property exists primarily for Edward Hines Park, as it is topographically lower than the Site.

01 ☑ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: _____) ☑ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
Surface water runoff could flow into the residential sewers and contaminate the System.

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

N/A

III. TOTAL POPULATION POTENTIALLY AFFECTED: 101,712

IV. COMMENTS

N/A

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

MDNR Lansing files E.R.D.
Wayne County Health Department

EPA FORM 2070-12 (7-81)

5E0301-A0101

High - GGSW
1/31/89

SITE DESCRIPTION/EXECUTIVE SUMMARY

State Lead

Site Name and Location

Cooper School
28611 Ann Arbor Trail
Westland, MI 48185

County: Wayne
Michigan Code Number: 82-02S-09E-01CB
DNR District: Detroit
EPA ID Number: MID981189905

SAS Score/Screen No.: 02

The Cooper School site was an active municipal waste landfill from approximately 1925 to 1952. According to the Wayne County Health Department records, the types and amounts of municipal waste deposited in the landfill are unknown as well as its size.

The landfill, located on Cooper Elementary School property, is unfenced, and adjacent to a highly populated residential area and public park. The Rouge River, located approximately 800 feet from the site, flows through the park and lends itself to potential contamination through surface water runoff should the landfill be leaking.

The drinking water for residents within a three mile radius of the site is derived from Detroit's municipal water system, and is not threatened by the presence of the landfill.

No testing of water or soil has been conducted, and it is not known whether or not leachate from the landfill is present. The potential for such leachate is high as the site was active prior to Act 87, requiring the licensing of landfills.

Further research and preliminary water and soil testing is recommended as this landfill has the potential of endangering approximately four hundred children attending the school, as well as nearly 100,000 residents in the surrounding area.

Recommendations for EPA

This site receives a high priority for inspection
Pre-HRS Score: To be determined
Projected HRS Score: To be determined
SI Priority: High - State lead

Hours Spent:	10	+ .5	+	+	+	= 10.5
Initial & Date:	11-17-87	SC.				

Date of Previous Summary:
Previous Author:

Current Date: 11-12-87
Author: Debra Spakoff

Site Assessment Unit
Environmental Response Division
Michigan Dept. of Natural Resources

Ref # 4
Site Name Cooper School
MID # 981189905

Site Name Cooper School
County Wayne

CALL LOG

1) Verify Site Location and Size.
2) Verify # and size of each containment structure.
3) Is there existing exposure of people documented?
4) Is the site fenced? Is it secure?
5) If sampling was done, how were samples collected? i.e. random selective, surface grab, composite etc..
6) Has the fire marshall considered the site a fire hazard?
7) What type of companies used the site? (Origin of chemicals)

DATE	AGENCY	PHONE NUMBER	PERSON CONTACTED
2-12-88 2:00pm	Livonia City Hall Water Service Dept.	(313) 421-2000	Tom Moore

The S.W. part of Livonia (S. of Plymouth Rd & W. of Wayne) has a few homes that use groundwater for irrigation. Several residents near Newburgh Lake use groundwater for drinking

2-17-88 3:00 pm	Livonia City Hall Water Service Dept.	313) 421-2000	Tom Moore

W.C.H.D issues well permits and so a Barbara Brant will call to give me a list of these homes. (326-4900) Permit Dept (729-2211)

Tom will send me a list of homes with sewer only service. This excludes those people with private water & sewer as well as those who have a well for irrigation purposes in addition to their City water supply.

2-26-88 3:45pm Westland Water Dept. (313) 467-3275 Arthur W. Tala Superintendent of the Water Division

Homes recieving sewer only service are getting their water from adjacent cities. Mr Witala is not aware of anyone who is using groundwater for drinking purposes however, he knows of 3-4 homes which use groundwater occasionally for watering their lawns in the summer. Location of the homes is not known.

Prepared by: Debra A. Skakoff

Site Name Cooper School

County Wayne

CALL LOG

1) Verify Site Location and Size.
2) Verify # and size of each containment structure.
3) Is there existing exposure of people documented?
4) Is the site fenced? Is it secure?
5) If sampling was done, how were samples collected? i.e. random selective, surface grab, composite etc..
6) Has the fire marshall considered the site a fire hazard?
7) What type of companies used the site? (Origin of chemicals)

DATE	AGENCY	PHONE NUMBER	PERSON CONTACTED
10-28-87	Wayne Co. Health Dept.	(313)326-4900	Bob Ratz

The site was an active municipal waste landfill between 1925 + 1952 (approx. dates). The exact size of the I.D. and types of waste is not known. An elementary school has been built adjacent to the site. The site is unfenced. No testing has been done.

Prepared by: Debra A Gpakoff

Ref # 5
Site Name Cooper School
MID # 981189905

WAYNE COUNTY DEPARTMENT OF HEALTH

ENVIRONMENTAL HEALTH DIVISION

3669 METRO PLACE MALL
WAYNE, MICHIGAN 48184
Telephone: (313) 326-4900

VERNICE DAVIS-ANTHONY, MPH
Health Officer

DONALD LAWRENCHUK, M.D., MPH
Medical Director

October 1, 1984

Mr. Lonnie Lee
DNR - Remedial Actions
Stevens T. Mason Bldg.
P. O. Box 30028
Lansing, Michigan 48909

Dear Mr. Lee:

Re: Landfill Sites for Evaluation Under Act 307

Enclosed is information on seven (7) old landfills within Wayne County. Two (2) of these landfills are already on the Act 307 priority list, however, some of the provided information may be new. The other five (5) sites are landfills that this department has some concerns over and thought they should be evaluated and scored by your group. The sites are:

1. Satterlee Hard Fill - Sumpter Twp. (previously scored)
2. Satterlee Dump #2 - Romulus (Dump near Wicks Elementary School - previously scored)
3. Mendrick's - Romulus (Located adjacent to and north of Satterlee Dump #2)
4. Cooper School site - Livonia
5. National Airport site - Westland
6. Dial Trucking - Plymouth
7. Erving Brown - Flat Rock

The information enclosed is somewhat sketchy for some sites, however, it is the best available. If you have any questions please contact me at (313) 326-4900, ext. 70.

Very truly yours,

Robert N. Ratz, P.E.
Public Health Engineer

RNR:ls

Enclosures

Bob Cate

Cooper School → Elementary

E. of Middlebelt / S. of AA Trail

UCND 313 326-4900 x.70

SITE NAME Cooper School Site (LANDFILL)

SITE LOCATION T2S R9E Sec1 NW¼ SW¼

SITE SIZE ≈ 5-10 ACRES SITE APPEARS TO BE LEAKING

EXPOSURE POTENTIAL SITE IS LOCATED NEAR A PARK + Elementary School

FENCING, SECURE NO FENCING NOT SECURE

SAMPLING DATA NONE

FIRE HAZARD NONE

WASTE TYPES + COMPANIES MUNICIPAL WASTE

→ SITE NAME REDFORD TWP #1 DUMP

SITE LOCATION T1S R10E Sec 29 SW¼

SITE SIZE

EXPOSURE POTENTIAL NO PROBLEMS EVIDENT

FENCING, SECURE Fencing up but side not secure

SAMPLING DATA NONE

FIRE HAZARD NONE

WASTE TYPES + COMPANIES MUNICIPAL Suspected

→ SITE NAME REDFORD TWP #2 DUMP

SITE LOCATION T1S R10E Sec20 N½ SE¼

SITE SIZE

EXPOSURE POTENTIAL Bodega Steak House Restaurant LOCATED ON SITE GAS VENTING BEING DONE NO APPARENT PROBLEMS

FENCING, SECURE SITE NOT SECURE

SAMPLING DATA NONE

FIRE HAZARD

WASTE TYPES + COMPANIES MUNICIPAL

Ref # 7
Site Name Cooper School
MID # 98118490S

MICHIGAN
Ground-Water Resources

Ground water is the source of 17 percent of public-water supplies and nearly 100 percent of the domestic-water supplies in Michigan (Bedell, 1982). Ground water supplies 43 percent of the State's population; however, ground water accounts for only 4 percent of the total water used in the State because most supplies for large urban areas are from surface water, particularly the Great Lakes (Solley and others, 1983; Weist, 1978). Distant from the Great Lakes, water supplies generally are obtained from ground water. Ground-water withdrawal for irrigation is about 37 percent of the total water used for irrigation (Bedell and VanTil, 1979; Solley and others, 1983). Ground-water withdrawals in 1980 for various uses, and related statistics, are given in table 1.

Chemical characteristics of natural ground water in Michigan are determined primarily by the geologic environment through which the water flows. Natural ground water generally is suitable for human consumption and most other uses. Water from glacial deposits, at places, contains large concentrations of iron [2.5–5.0 milligrams per liter (mg/L)]; water from carbonate rocks is likely to be very hard (400–900 mg/L as calcium carbonate); and water from the Saginaw aquifer in the Saginaw Bay–Thumb area commonly is very mineralized (2,000–80,000 mg/L of dissolved solids). Throughout the State, salty water underlies freshwater at depths ranging from about 100 ft in the eastern part of the Lower Peninsula to about 900 ft in the northern part. Average dissolved-solids concentration of water from bedrock (535 mg/L) is about twice as great as the average concentration from glacial deposits (241 mg/L) (Cummings, 1980).

Michigan has identified more than 1,000 sites where ground water has been contaminated to some degree and an even greater number of sites where pollution is suspected (Michigan Department of Natural Resources, 1985). A wide range of contaminants is involved. At many sites, chlorinated hydrocarbons and hydrocarbons that are contained in fuel substances are the contaminants. Nitrates from surface sources have contaminated domestic ground-water supplies in concentrations of as much as 30 mg/L at some locations in the Lower Peninsula (Cummings and others, 1984).

Table 1. Ground-water facts for Michigan

[Withdrawal data rounded to two significant figures and may not add to totals because of independent rounding. Mgal/d = million gallons per day; gal/d = gallons per day. Source: Solley, Chase, and Mann, 1983]

Population served by ground water, 1980	
Number (thousands)	3,978
Percentage of total population	43
From public water-supply systems:	
Number (thousands)	1,310
Percentage of total population	14
From rural self-supplied systems:	
Number (thousands)	2,668
Percentage of total population	29
Freshwater withdrawals, 1980	
Surface water and ground water, total (Mgal/d)	15,000
Ground water only (Mgal/d)	530
Percentage of total	4
Percentage of total excluding withdrawals for thermoelectric power	18
Category of use	
Public-supply withdrawals:	
Ground water (Mgal/d)	220
Percentage of total ground water	41
Percentage of total public supply	17
Per capita (gal/d)	168
Rural-supply withdrawals:	
Domestic:	
Ground water (Mgal/d)	160
Percentage of total ground water	30
Percentage of total rural domestic	100
Per capita (gal/d)	60
Livestock:	
Ground water (Mgal/d)	17
Percentage of total ground water	3
Percentage of total livestock	77
Industrial self-supplied withdrawals:	
Ground water (Mgal/d)	62
Percentage of total ground water	12
Percentage of total industrial self-supplied:	
Including withdrawals for thermoelectric power	1
Excluding withdrawals for thermoelectric power	3
Irrigation withdrawals:	
Ground water (Mgal/d)	77
Percentage of total ground water	14
Percentage of total irrigation	37

GENERAL SETTING

Michigan is divided into two principal physiographic provinces. The Lower Peninsula and the eastern part of the Upper Peninsula of Michigan are in the Central Lowland physiographic province. These areas are underlain by layered sedimentary bedrock of Paleozoic and Mesozoic age. The western part of the Upper Peninsula is a part of the Superior Upland physiographic province, which is underlain by igneous, metamorphic, and sedimentary rocks of Precambrian age. Glacial deposits cover most of the State.

Glacial deposits consist of sand, gravel, silt, clay, and boulders. Sand and gravel, such as in outwash and glaciofluvial deposits, are productive aquifers; mixtures of clay, silt, sand, gravel, and boulders, which form some till deposits, generally are poor aquifers. Lacustrine deposits that are predominantly sand are productive aquifers; those that are predominantly clay yield little or no water. In the northern part of the Lower Peninsula, glacial deposits in some areas are more than 800 feet (ft) thick; in most other areas in the State, the deposits are less than 200 ft thick.

In the Lower Peninsula and eastern Upper Peninsula, bedrock, which underlies glacial deposits and crops out at a few places, consists principally of Paleozoic shale, limestone, and sandstone. These rocks have been deformed into a structural feature known as the Michigan basin (Newcombe, 1933). Sandstone and limestone are productive aquifers and, where near enough to land surface to be recharged by precipi-

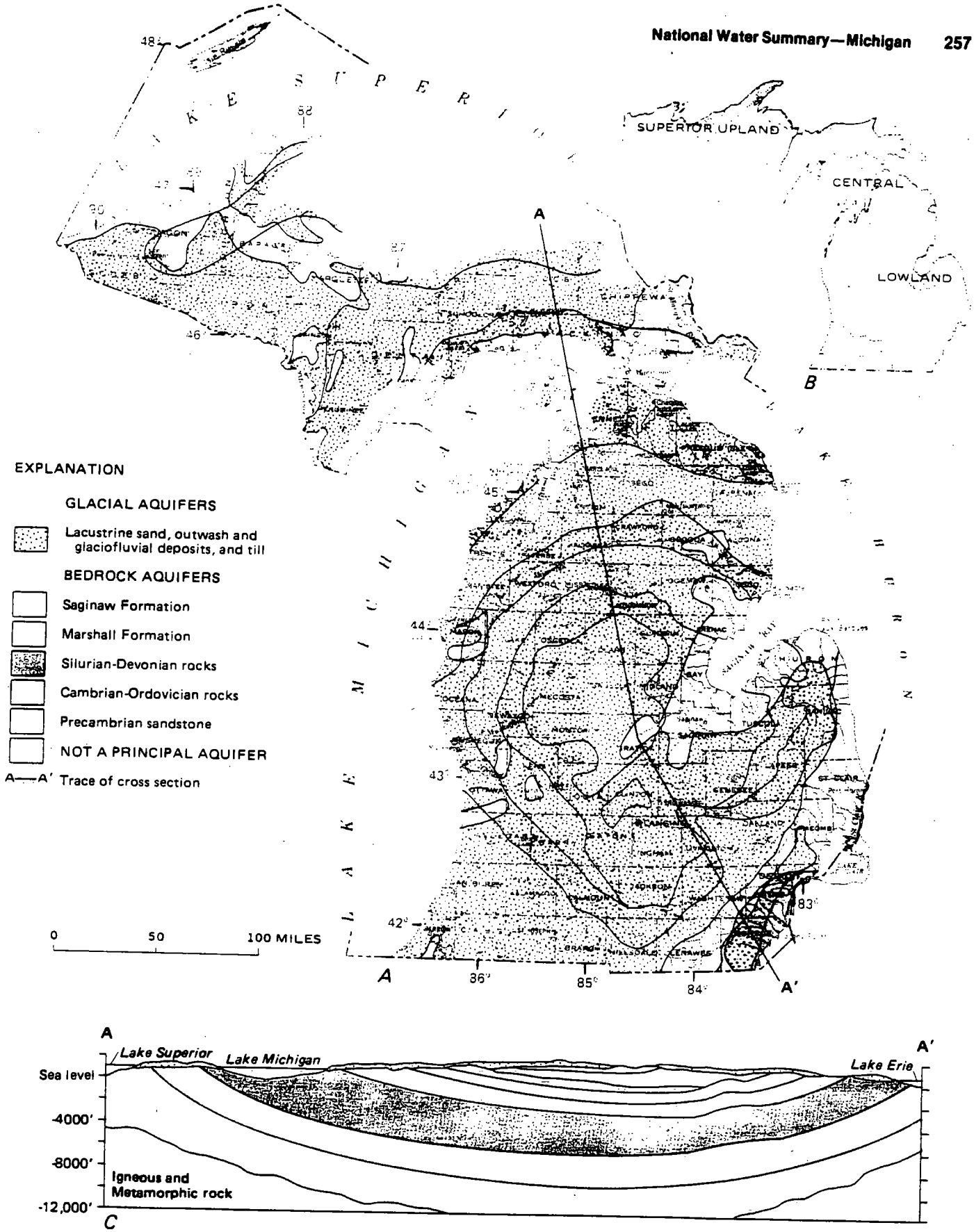
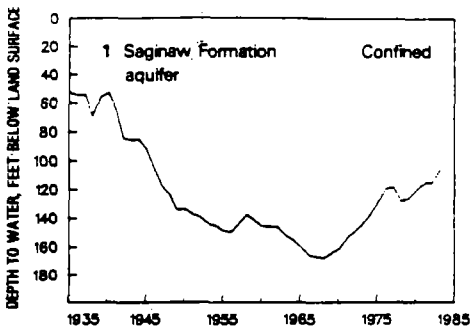
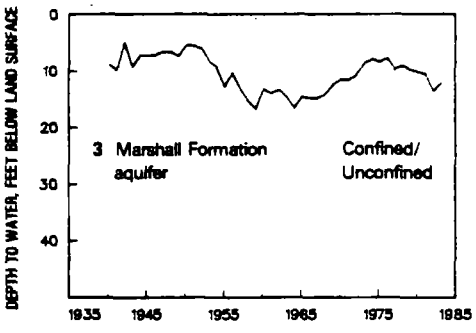
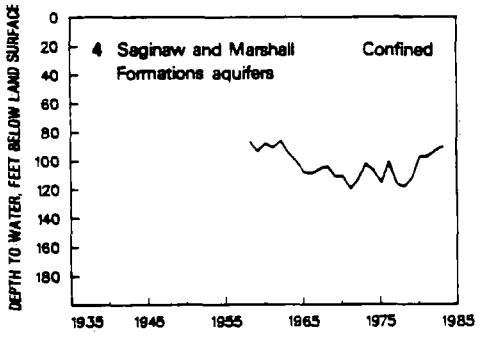
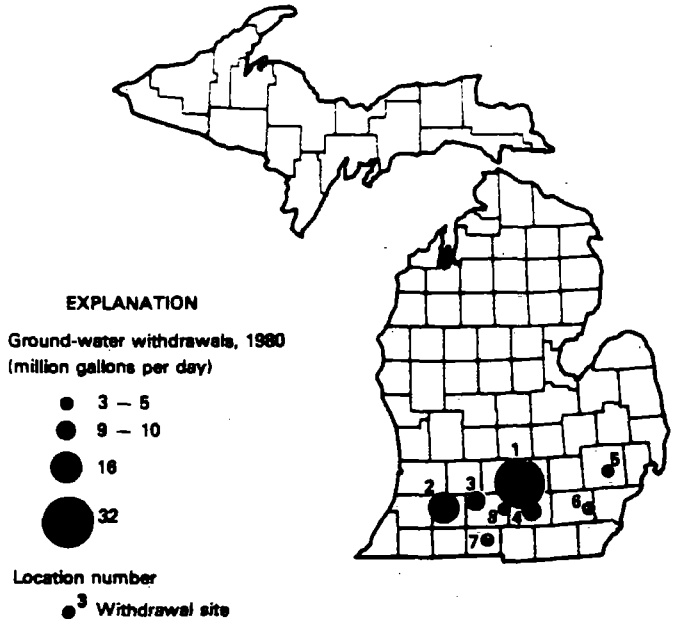


Figure 1. Principal aquifers in Michigan. *A*, Geographic distribution. *B*, Physiographic diagram and divisions. *C*, Generalized cross section (A-A'). (See table 2 for more detailed description of aquifers. Sources: *A*, Farrand, 1982. *B*, Martin, 1936; Raisz, 1954. *C*, Compiled by N. G. Grannemann from U.S. Geological Survey files.)









WITHDRAWAL SITES

[Withdrawals are principally for public supply]

No. on map	Geographic area	Aquifer
1	Lansing, East Lansing, Michigan State University.	Saginaw Formation, glacial deposits.
2	Kalamazoo.	Glacial deposits.
3	Battle Creek	Marshall Formation.
4	Jackson.	Saginaw and Marshall Formations.
5	Waterford Township	Glacial deposits.
6	Ypsilanti, Ypsilanti Township.	Do.
7	Coldwater	Do.
8	Albion	Marshall Formation.

Figure 2. Areal distribution of major ground-water withdrawals and graphs of annual greatest depth to water in selected wells in Michigan. (Sources: Withdrawal data from Bedell, 1982; water-level data from U.S. Geological Survey files.)

GEOLOGICAL SURVEY SAMPLE NO.

WATER WELL RECORD
ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

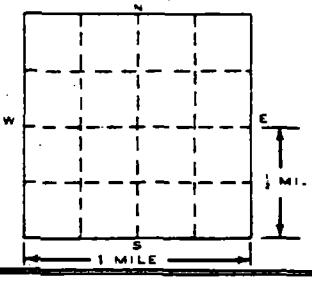
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Wayne	Dearborn Heights	¼ ¼ ¼	6	2 N/S.	10 E/W

Distance And Direction from Road Intersections: Carriage Park Apts. 8514 Inkster Rd. Dearborn Heights — SE Corner of Inkster and Joy Rd.

Street address & City of Well Location

Locate with "X" in section below



Sketch Map: Well #7

3 OWNER OF WELL: Carriage Hill Apt. Co.
Address: 2900 West Maple, Troy, Mi 48084

4 WELL DEPTH: (completed) 81 ft. Date of Completion: May 15, 82

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☐ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☒ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☒ Welded ☐ Diam. 5 in. to 69 ft. Depth; ____ in. to ____ ft. Depth
Height: Above/Below Surface ____ ft. Weight ____ lbs./ft. Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Top Soil	3	3
Black Clay	5	8
Gray Clay	4	12
Gray clay gravel	3	15
Gray Clay	45	50
Gray Clay & Gravel	26	76
Sand & Gravel	5	81

USE A 2ND SHEET IF NEEDED

8 SCREEN: Johnson
Type: s/s w/w Dia.: 5"
Slot/Cover 50 Length 5'
Set between ____ ft. and ____ ft.
Fittings:

9 STATIC WATER LEVEL 9 ft. below land surface

10 PUMPING LEVEL below land surface
____ ft. after ____ hrs. pumping ____ g.p.m.
____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☐ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ____
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination
____ feet ____ Direction ____ Type
Well disinfected upon completion ☐ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name ____
Model Number ____ HP ____ Volts ____
Length of Drop Pipe ____ ft. capacity ____ G.P.M.
Type: ☐ Submersible ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

DRY HOLE = WON'T PUMP WATER

ADDED INFO BY DRILLER, ITEM NO.
*CORRECTED BY
**ADDITION BY
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Brown Drilling Co. Inc. (REGISTERED BUSINESS NAME) 0026 (REGISTRATION NO.)

Address: Howell, Mi 48843

Signed: [signature] (AUTHORIZED REPRESENTATIVE) Date ____

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

AUG 16 1982

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

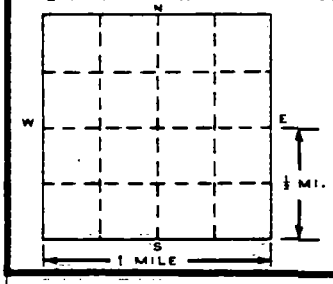
County	Township Name	Fraction	Section Number	Town Number	Range Number
Wayne	Dearborn Heights	¼ ¼ ¼	6	2 N/S.	10 E/W

Distance And Direction from Road Intersections

Carriage Park Apts. 8514 Inkster Rd. — SE Corner of Inkster and Joy Rd.

Street Dearborn Heights Location

Locate with "X" in section below



Sketch Map: Well #6

3 OWNER OF WELL: Carriage Hill Apt. Co.

Address: 2900 West Maple, Troy, Mi 48084

4 WELL DEPTH: (completed) 156 ft. Date of Completion: May 4, 82

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☐ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☒ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☒ Welded ☐ Diam. 5 in. to 105 ft. Depth; ____ in. to ____ ft. Depth

Height: Above/Below Surface ____ ft. Weight ____ lbs./ft. Drive Shoe? Yes ☐ No ☐

8 SCREEN: Type: Rock Dia.: ____ Slot/Gauze ____ Length ____ Set between ____ ft. and ____ ft. Fittings:

9 STATIC WATER LEVEL 9 ft. below land surface

10 PUMPING LEVEL below land surface ____ ft. after ____ hrs. pumping ____ g.p.m.; ____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ____ Chlorides (Cl) ____ Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☐ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ____ Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination ____ feet ____ Direction ____ Type

Well disinfected upon completion ☐ Yes ☐ No

15 PUMP: ☐ Not installed

Manufacturer's Name ____ Model Number ____ HP ____ Volts ____ Length of Drop Pipe ____ ft. capacity ____ G.P.M.

Type: ☐ Submersible ☐ Jet ☐ Reciprocating

2 FORMATION

FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown Clay	10	10
Gray Clay	36	46
Gray Clay & Fine Gravel	2	48
Gray Clay	9½	57½
Fine Gravel & Stone	2½	60
Gray Clay	15	75
Black & Brown Limestone Oily	5	80
White & Brown Limestone	15	95
Brown Limestone	2	97
Gray Limestone	8	105
Gray Limestone w/Shale Lenses	5	110
Gray Shale and Gray Limestone	6	116
Gray Brown Limestone	40	156

USE A 2ND SHEET IF NEEDED

16 Remarks, elevation, source of data, etc.

DRY HOLE - WON'T PUMP WATER

ADDED INFO BY DRILLER, ITEM NO.
*CORRECTED BY
**ADDITION BY
ELEVATION
DEPTH TO ROCK

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Brown Drilling Co. Inc. (REGISTERED BUSINESS NAME) 0026 (REGISTRATION NO.)

Address Howell, MI 48843

Signed Harry L Brown (AUTHORIZED REPRESENTATIVE) Date ____

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

GEOLOGICAL SURVEY SAMPLE NO. ~~Abu 16 1562~~

WATER WELL RECORD
ACT 294 PA 1965

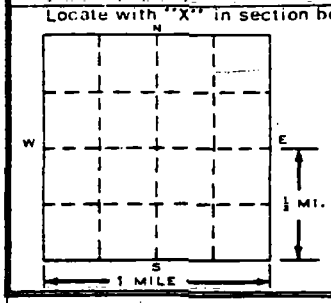
MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Wayne	Dearborn Heights	¼ ¼ ¼	6	2 S.	10 E.

Distance And Direction from Road Intersections
Carriage Park Apts. SE Corner Of Inkster and Joy Rds.
8514 Inkster
Dearborn Heights, Mich. Bldg. #2
Street Address or Nearest Location

Locate with "X" in section below



Sketch Map:
Well # 5

3 OWNER OF WELL:
Address: Carriage Hill Apt. Co.
2900 West Maple
Troy, Mi 48084

4 WELL DEPTH: (completed) 378 ft. Date of Completion: April 2, 82

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☐ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☒ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☒ Welded ☐ Diam. 6 in. to 107 ft. Depth; ____ in. to ____ ft. Depth
Height: Above/Below Surface 6 ft.
Weight ____ lbs./ft.
Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Top Soil	½'	½'
Brown Clay	14½	15
Gray Clay	30	45
Gray Clay & Gravel	31	76
Gray Clay & Cobbles w/Occ. Boulder	23	99
Brown Limestone	2	101
Boulders & Cobblestone	3	104
Hard Gray Shale	13	117
Greyish Black Shale	3	120
Gray Shale	9	129
BRown Shale	2	131
Soft Med Gray Shale	2	133
Lime Stone	87	220
Gray Shale	50	270
Lime Stone	45	315
Sandstone	60	375
Black Shale	3	378

ADD SHEET IF NEEDED

8 SCREEN: Rock
Type: ____ Dia.: ____
Slot/Gauze ____ Length ____
Set between ____ ft. and ____ ft.
Fittings:

9 STATIC WATER LEVEL
____ ft. below land surface

10 PUMPING LEVEL below land surface
____ ft. after ____ hrs. pumping ____ g.p.m.
____ ft. after ____ hrs. pumping ____ g.p.m.

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☐ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☒ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ ____
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination
____ feet ____ Direction ____ Type
Well disinfected upon completion ☐ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name ____
Model Number ____ HP ____ Volts ____
Length of Drop Pipe ____ ft. capacity ____ G.P.M.
Type: ☐ Submersible ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

DRY HOLE = WON"T MAKE OR TAKE WATER

ADDED INFO BY DRILLER, ITEM NO.
*CORRECTED BY
**ADDITION BY
ELEVATION

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

~~Brown Drilling Co. Inc.~~ REGISTERED BUSINESS NAME — 0026 REGISTRATION NO.

Address ~~Howell, Mi 48842~~

Signed Henry L. Brown AUTHORIZED REPRESENTATIVE Date ____

D67d 100M (Rev. 12-68) DEPTH TO ROCK

GEOLOGICAL SURVEY COPY

3

GEOLOGICAL SURVEY JAN 29 1981

WATER WELL AND PUMP RI

PART 127 ACT 368, P.A. 1978

Ref. # 2
Site Name Cooper School
MID # 98189905

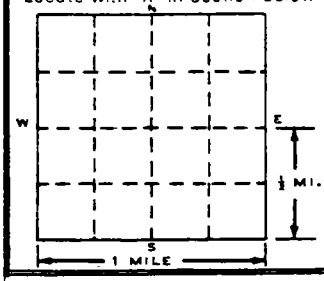
1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Wayne	Dearborn Heights	¼ ¼ ¼	6	2 N	10 E/W

Distance And Direction From Road Intersection

700' S.E. of Inkster & Joy Road
Carriage Park Apartments
Street Address or City of Well Location 8640 Canfield, Dearborn Heights 48127

Locate with "X" in Section Below



Sketch Map.

3 OWNER OF WELL:

Address: Carriage Hill Apartments Co.
2900 W. Maple Road
Troy, Michigan 48084

Address Same As Well Location? ☐ Yes ☒ No

4 WELL DEPTH (completed) 403 ft. — **Date of Completion** 12/28/81

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Auger ☐ Jetted ☐ _____

6 USE: ☐ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☒ Test Well ☐ Type IIb Public ☐ _____

7 CASING: Diameter ☒ Steel ☒ Threaded ☐ Plastic ☐ Welded
4 in. to 92 ft. depth
_____ in. to _____ ft. depth
Grouted Drill Hole Diameter
6 3/4 in. to 92 ft. depth
_____ in. to _____ ft. depth

Height Above/Below Surface 1 ft.
Weight 11 lbs./ft.
Drive Shoe ☒ Yes ☐ No

8 SCREEN ☐ Not Installed
Type _____ Diameter _____
Slot/Gauze _____ Length _____
Set between _____ ft. and _____ ft
FITTINGS: ☐ K-Packer ☐ Lead Packer ☐ Bremer Check
☐ Blank above screen _____ ft. Other _____

9 STATIC WATER LEVEL
4 ft. below land surface ☐ Flow

10 PUMPING LEVEL: below land surface
120 ft. after 4 hrs. pumping at 60 G.P.M.
_____ ft after _____ hrs. pumping at _____ G.P.M.

11 WELL HEAD COMPLETION ☐ Pitless adapter ☒ 12" above grade ☐ Basement offset ☐ Approved p.t

12 WELL GROUTED? ☐ No ☒ Yes From 0 to 92 ft.
☐ Neat cement ☒ Bentonite ☐ Other _____
No. of bags of cement _____ Additives _____

13 Nearest source of possible contamination
Type Storm Drain Distance 50 ft. Direction east
Well disinfected upon completion? ☐ Yes ☒ No

14 PUMP ☒ Not installed ☐ Pump Installation Only
Manufacturer's name _____
Model number _____ HP _____ Volts _____
Length of Drop Pipe _____ ft. capacity _____ G.P.M.
TYPE: ☐ Submersible ☐ Jet _____
PRESSURE TANK
Manufacturer's name _____
Model number _____ Capacity _____ Gallons

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Fill sand and gravel	10'	10
Clay (gray)	40'	50
Heavy gravel with clay	2'	52
Sharp, firm medium gravel	11'	63
Medium and fine waterground	5'	68
Gray clay with some gravel	7'	75
Layered sharp gravel and watersand	15'	90
Limestone	47'	137
Sahle and limestone(mixed)	58'	195
Sandstone and gray shale	125'	320
Sandstone	61'	381
Gray Shale	3'	384
Salt	19'	403
ADDED MISC BY DRILLER, ITEM NO.		
COMPLETED BY		
ADDITION BY		
ELEVATION		
USE A 2ND SHEET IF NEEDED — DEPTH TO ROCK		

15. Remarks, elevation, source of data, etc.

2" opening in bedrock at 97'
oil at 114'
381' - 403' Blackwater, brinetaste
sulphur smell

16. WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

M. Sullivan Well Drilling 63-1790
REGISTERED BUSINESS NAME — REGISTRATION NO.
Address 9375 Big Lake Road, Clarkston, Michigan
Signed _____ (AUTHORIZED REPRESENTATIVE) Date 3/4/82

D67d (Rev. 10-80)

GEOLOGICAL SURVEY COPY

AUG 16 1982

WATER WELL RECORD
ACT 294 PA 1965

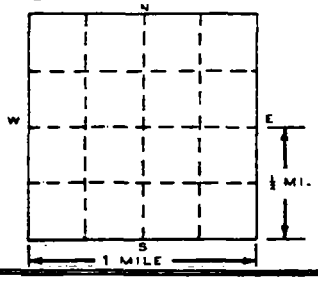
MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Wayne	Dearborn Heights	¼ ¼ ¼	6	2 N/S.	10 E/W

Distance And Direction from Road Intersections
Carriage Park Apts. 8514 Inkster Rd. Dearborn Heights — Se Corner of Inkster and Joy Rd.
Street address or location

Locate with "X" in section below



Sketch Map: Well #8

3 OWNER OF WELL: Carriage Hill Apt. Co.
Address: 2900 West Maple, Troy, Mi 48084

4 WELL DEPTH: (completed) 159 ft. Date of Completion: May 27, 82

5 ☐ Cable tool ☒ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ____

6 USE: ☐ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☒ Air Conditioning ☐ Commercial ☐ Test Well ☐ ____

7 CASING: Threaded ☒ Welded ☐ Diam. 5 in. to 99 ft. Depth; ____ in. to ____ ft. Depth
Height: Above/Below Surface ____ ft. Weight ____ lbs./ft. Drive Shoe? Yes ☒ No ☐

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Black Top soil	2	2
Brown Clay	7	9
Gray Clay	61	70
Gray Clay and Bolders	27	97
Limestone Brown	23	120
Gray Shale	6	126
Brown Limestone	14	140
Blue Shale	19	159

ADDED INFO BY DRILLER, ITEM NO.
*CORRECTED BY
**ADDITION BY
ELEVATION
DEPTH TO ROCK
USE A 2ND SHEET IF NEEDED

8 SCREEN: Rock Well
Type: ____ Dia.: ____
Slot/Gauze ____ Length ____
Set between ____ ft. and ____ ft.
Fittings:

9 STATIC WATER LEVEL
9 ft. below land surface

10 PUMPING LEVEL below land surface
20 ft. after ½ hrs. pumping 10 g.p.m. w/Air
159 ft. after 1½ hrs. pumping 75 g.p.m. w/Air

11 WATER QUALITY in Parts Per Million:
Iron (Fe) ____ Chlorides (Cl) ____
Hardness ____ Other ____

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☐ Pitless Adapter ☐ 12" Above Grade

13 Well Grouted? ☐ Yes ☐ No ☐ Neat Cement ☐ Bentonite ☐ ____
Depth: From ____ ft. to ____ ft.

14 Nearest Source of possible contamination
____ feet ____ Direction ____ Type
Well disinfected upon completion ☐ Yes ☐ No

15 PUMP: ☐ Not installed
Manufacturer's Name ____
Model Number ____ HP ____ Volts ____
Length of Drop Pipe ____ ft. capacity ____ G.P.M.
Type: ☐ Submersible ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.
This Well pumps Heavy good

17 WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Brown Drilling Co. Inc. (REGISTERED BUSINESS NAME) 0026 (REGISTRATION NO.)
Address: Howell, Mi 48843
Signed ____ (AUTHORIZED REPRESENTATIVE) Date ____

D67d 100M (Rev. 12-68)

GEOLOGICAL SURVEY COPY

GEOLOGICAL SURVEY NO. 3

DEC 16 1981

WATER WELL AND PUMP RECORD

DEC - 2 1981

PART 127 ACT 368, P.A. 1978

PERMIT NUMBER

1 LOCATION OF WELL

County	Township Name	Fraction	Section Number	Town Number	Range Number
Wayne	Dearborn Heights	¼ ¼ ¼	6	2 N(S)	10 E/W

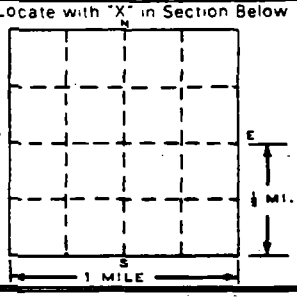
Distance And Direction From Road Intersection

400 Ft. S. E. of Inkster & Joy Roads
Carriage Park Apartments
8640 Canfield, Dearborn Heights, MI

Street Address & City of Well Location

Locate with "X" in Section Below

Sketch Map



3 OWNER OF WELL

Carriage Park Apartments
Address 2900 W. Maple Road
Troy, MI 48084

Address Same As Well Location? ☐ Yes ☒ No

4 WELL DEPTH: (completed) 92 ft. | Date of Completion 11/21/81

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Auger ☐ Jetted ☐ _____

6 USE: ☐ Domestic ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat pump ☒ Test Well ☐ Type IIb Public ☐ _____

7 CASING: Diameter ☐ Steel ☐ Threaded ☐ Plastic ☐ Welded
4 in. to 63 ft. depth
_____ in. to _____ ft. depth
Grouted Drill Hole Diameter
_____ in. to _____ ft. depth
_____ in. to _____ ft. depth

Height: Above/Below
Surface 1 ft
Weight 11 lbs /ft
Drive Shoe ☒ Yes ☐ No

8 SCREEN: ☐ No Installed
Type Johnson Stainless Diameter 4"
Slot/Gauze 25-25-25-35-35 Length 31'
Set between 65 ft. and 92 ft.
FITTINGS: ☒ K-Packer ☐ Lead Packer ☐ Bremer Check
☒ Blank above screen 2 ft. Other 68'-75' Blank

9 STATIC WATER LEVEL:
9 ft. below land surface ☐ Flow

10 PUMPING LEVEL: below land surface
60 ft. after 8 hrs. pumping at 10 G.P.M.
60 ft. after 10 hrs. pumping at 15 G.P.M.

11 WELL HEAD COMPLETION: ☐ Pitless adapter ☒ 12" above grade ☐ Basement offset ☐ Approved pit

12 WELL GROUTED? ☒ No ☐ Yes From _____ to _____ ft.
☐ Neat cement ☐ Bentonite ☐ Other _____
No. of bags of cement _____ Additives _____

13 Nearest source of possible contamination
Type Storm Drain Distance 75 ft. Direction S.W.S.
Well disinfected upon completion? ☒ Yes ☐ No

14 PUMP: ☒ Not Installed ☐ Pump Installation Only
Manufacturer's name _____
Model number _____ HP _____ Volts _____
Length of Drop Pipe _____ ft. capacity _____ G.P.M.
TYPE: ☐ Submersible ☐ Jet _____
PRESSURE TANK
Manufacturer's name _____
Model number _____ Capacity _____ Gallons

2 FORMATION DESCRIPTION

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Fill Sand Gravel	10'	10'
Clay (grey)	40'	50'
Heavy Gravel w/Clay	2'	52'
Sharp Medium Gravel	11'	63'
Medium & Fine Water Gravel	5'	68'
Clay w/Some Gravel	7'	75'
Streaks Sharp Gravel, Water Sand	17'	92'
Black Shale, Sandstone, Med. Gravel		
(Balder at 80' & 91')		
(Gas Encountered about 53' to about		
80')		

USE A 2ND SHEET IF NEEDED

15. Remarks, elevation, source of data, etc.

Screen positions - 2' blank, 5' 25 slot, 7' blank, 2'-4' 25 slot, 2'-5' 35 slot (pump cavitates at 15 gpm.)

ADDED INFO. BY DRILLER, EXPL. NO.

CORRECTED BY

ADDITION BY

16. WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

M. Sullivan Well Drilling — REGISTERED BUSINESS NAME
63-1790 — REGISTRATION NO.

Address 9375 Big Lake Road, Clarkston, MI 48016

Signed _____ AUTHORIZED REPRESENTATIVE Date 11/25/81

D67d (Rev. 10-80)

GEOLOGICAL SURVEY COPY

32-1S-9E TD 4169 in Exploratory
Livonia Twp. (Wayne Co.) Black River
Dry

Peake Petroleum Company

Wayne County Road Commission No. 3 Permit No. 23362

Drilling Contractor: B. G. Hilliard (Rotary)

Location: NW¼ NW¼ NW¼ Section 32, T. 1S., R. 9E.
370' from North and 305' from West line of quarter section

Elevation: 654.4 feet above sea level (rot. bush.)

Record by: B. L. Champion from geologic log submitted by the company

	Thickness (feet)	Depth (feet)
PLEISTOCENE:		
Drift:		
Drift	117	117
MISSISSIPPIAN-DEVONIAN:		
Antrim-Traverse Formation (?):		
Shale, "Antrim"	118	235
DEVONIAN:		
Traverse Limestone:		
Dolomite, light brown, medium coarse	10	245
Dolomite, cherty	18	263
Dolomite, light brown	12	275
Limestone, gray	5	280
Limestone and dolomite	5	285
Shale, gray	40	325
Shale and limestone	8	333
Shale, gray	27	360
Shale and limestone	5	365
Shale, gray	61	426
	(191)	
Dundee:		
Limestone, light brown	64	490
Dolomite, light brown, finely crystalline, limy	56	546
	(120)	
Detroit River:		
Dolomite, light buff, very very finely crystalline	9	555
Dolomite, light brown, very finely crystalline, anhydritic	60	615
Dolomite, light gray, anhydritic	10	625
Dolomite, very very finely crystalline, anhydritic	10	635
Dolomite, light brown, finely crystalline, sucrosic	18	653
Dolomite, gray brown, very finely crystalline	7	660
Anhydrite	8	668
Dolomite and anhydrite	?	675
Dolomite, light brown, finely crystalline	11	686

	Thickness (feet)	Depth (feet)
Sylvania:		
Very porous and sandy dark buff gray bituminous and granular dolomite. Pure white quartz grains embedded in a matrix of dolomite.	10	505
Grayish to pure white fine grained sandstone, little cemented. Glass sand	50	555
Grayish white dolomitic sandstone	15	570
Hard very dolomitic gray sandstone and very sandy dolomite	10	580
Pure white fine grained sandstone-glass sand	5	585
Gray to dark gray sandy to very sandy dolomite and pure white and gray dolomitic sandstone	15	600
White to pure white sandstone grading downward into gray sandstone	20	620
Silurian:		
Bass Island:		
Basin River Dolomite Member:		
Gray to dark gray dense grained dolomite with much chert and some anhydrite	45	665
Light to dark buff and gray dolomite in places very argillaceous and some streaks of anhydrite	30	695
Light to very light gray and buff fine grained dolomite, porous and colitic from 715-720 feet. very cherty from 720-725 feet; and locally bituminous. Some streaks of anhydrite.	45	740
Dark buff, bituminous and laminated finely granular dolomite	5	745
Gray to light grayish and buff dolomite and colite with bituminous laminae	20	765
Bluish gray argillaceous dolomite with bluish mottlings and streaks, and very light buff to dark buff or brown bituminous and laminated dolomite, and some gray shale near the bottom	10	775
Light grayish buff dolomite	15	790
Light buff gray mottled and streaked dolomite, colite at the top and gray to bluish gray laminated bituminous and very argillaceous dolomite toward the bottom	20	810
Very light to light grayish buff dolomite, locally very argillaceous and with much white and gray anhydrite, especially below 820 feet.	35	845
Blue and buff argillaceous dolomite at the top; with pure white anhydrite at the bottom	5	850
Chiefly pure white anhydrite with some buff laminated dolomite	5	855
Dark buff, gray and black dolomite in places very argillaceous and bituminous, and with a thin bed of colite below 855 feet. Some anhydrite in streaks and in cavities	30	885
Light buff gray anhydrite and dolomite	20	905
Tymochtee Member:		
Grayish buff to dark gray very argillaceous dolomite, blue gray and buff shale, celestite, anhydrite	35	940
Red shaly dolomite; soft gray and red shale	15	955
Chiefly dark gray shale and shaly dolomite	35	990

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